AL.2.1998-246
University of Alberta Library
0 1620 3366906 8

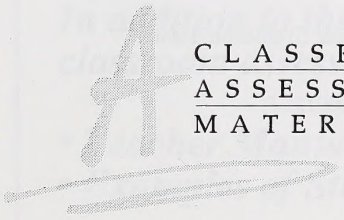
MATHEMATICS 14

Student Materials

CLASSROOM ASSESSMENT MATERIALS

MATHEMATICS 14

STUDENT MATERIALS



CLASSROOM
ASSESSMENT
MATERIALS

Alberta
EDUCATION

Copyright © 1997, the Crown in Right of Alberta, as represented by the Minister of Education, Alberta Education, 11160 Jasper Avenue, Edmonton, Alberta T5K 0L2. All rights reserved.

No part of this work may be reproduced or transmitted in any form or by any means, electronic, mechanical, recording or otherwise, or by any information storage and retrieval system, without permission in writing from the Minister of Education.

Teachers may photocopy "Student Materials" as required for educational use.

Additional copies may be purchased from Education Advantage Inc. and/or from the Learning Resources Distributing Centre.

Canadian Cataloguing in Publication Data

Main entry under title:

Mathematics 14

(Classroom Assessment Materials Project (CAMP))
Compiled by Alberta Education, Student Evaluation Branch.
Contents: Teacher manual - Student materials - Examples of students' responses.
ISBN 1-55249-067-X (set) -
ISBN 1-55249-064-5 (Teacher manual) -
ISBN 1-55249-065-3 (Student materials) -
ISBN 1-55249-066-1 (Students' responses)

1. Mathematics--Alberta--Examinations.
2. Academic achievement--Alberta--Testing.
3. Education, Secondary--Alberta--Evaluation.
I. Education Advantage (Firm). II. Alberta. Student Evaluation Branch.
III. Title: Mathematics fourteen.. IV. Series.

QA43.M3314 1997 510'.76 C97-900125-0

Printed and Bound in Canada

Manufactured and Distributed by:

Education Advantage Inc.
Edmonton AB

Cover Illustrated by Hung Lee, a student from
Eastglen High School, Edmonton.
Teacher Mr. G. Prokop.

UNIVERSITY LIBRARY
UNIVERSITY OF ALBERTA

Mathematics 14

This package of Student Materials contains

- *End-of-Course Exam*
- *Performance Assessment*

In addition to the Student Materials, this classroom assessment package includes

- *Teacher Manual*
- *Examples of Students' Responses*

CLASSROOM ASSESSMENT MATERIALS

Digitized by the Internet Archive
in 2016

https://archive.org/details/mathematics1400educ

Mathematics 14

End-of-Course Exam

CLASSROOM
ASSESSMENT
MATERIALS

End-of-Course Exam

Description

Time allotted: 2 hours
Total possible marks: 56

This is a **closed-book** test consisting of **two** parts:

Part A
has 41 selected-response questions each with a value of one mark.

Part B
has 3 written-response questions for a total of 15 marks.

Instructions

- Fill in the information required on the answer sheet and the test booklet as directed by your teacher.
- You are expected to provide your own calculator and protractor; you can tear off the formula sheet provided.
- Carefully read the instructions for each part before proceeding.
- Do not fold the answer sheet.

Part A: Selected Response (41 Questions)

Instructions for Selected Response

- Read each question carefully and decide which of the choices **best** completes the statement or answers the question.
- Locate that question number on the separate answer sheet provided and fill in the space that corresponds to your choice.
- **Use an HB pencil only** for the machine-scored answer sheet.
- If you wish to change an answer, erase **all** traces of your first answer.

1. When calculating the sum $4\frac{2}{3}+5\frac{1}{6}-3\frac{5}{8}$, the lowest common denominator is

A. 8
B. 17
C. 24
D. 144

2. Janice and three of her friends shared $4\frac{1}{2}$ L of pop. If all of the group shared the pop equally, how much would each member of the group receive?

A. $7\frac{1}{2}$ L

B. $1\frac{1}{2}$ L

C. $1\frac{1}{8}$ L

D. $\frac{1}{2}$ L

3. The expression $0.21 \div 0.3$ is equivalent to the fraction

A. $\frac{21}{3}$

B. $\frac{210}{3}$

C. $\frac{21}{300}$

D. $\frac{21}{30}$

4. Twelve percent of 95 is

A. 7.92
B. 11.4
C. 107
D. 792

5. A $65.00 pair of jeans is on sale. The advertisement states that the jeans will be reduced by 15%. The sale price, before tax, is

A. $9.75
B. $50.00
C. $55.25
D. $64.85

6. The quantity 2^4 means

A. $2 + 4$
B. 2×4
C. $2 + 2 + 2 + 2$
D. $2 \times 2 \times 2 \times 2$

7. The value of $(-3b)^2$, when $b = 21$, is

A. 3 969
B. 1 323
C. –1 323
D. –3 969

8. The number of lines of symmetry in a square is

A. 0
B. 2
C. 4
D. 8

9. The number of degrees in a complete circle is

A. 360
B. 180
C. 100
D. 90

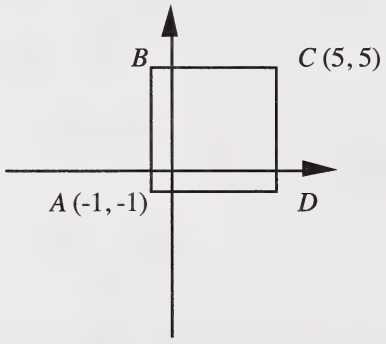
10. Alan and Beverley rented a hall for a wedding. The charges were $250.00 plus $10.00 per person who attended. How much did they pay if 75 people attended the wedding?

A. $325.00
B. $335.00
C. $750.00
D. $1 000.00

11. For a school concert, the tickets were priced at $4.00 for adults and $2.50 for children. On one particular night, $500 was collected, and 30 adults were present. How many children were present?

A. 380
B. 188
C. 152
D. 95

Use the following information to answer the next question.



A square *ABCD* is constructed. The point *A* is (–1, –1) and the point *C* is (5, 5).

12. The centre point of the square is

A. (0, 0)
B. (1, 1)
C. (2, 2)
D. (3, 3)

13. The distance between the points –5 and 17 on a number line is

A. 6
B. 11
C. 12
D. 22

Use the following information to answer the next two questions.

The Wimbledon tennis championships have 128 entrants in the women's singles competition. All 128 players start in the first round. Winners of first-round matches advance to the second round, while first-round losers are out of the tournament. The second round, and all the following rounds, are organized the same way. This continues until there is only the champion remaining undefeated. The table below shows the number of players in each round:

Round	Number of players
First	128
Second	64
Third	32

14. The total number of matches played is

A. 64
B. 127
C. 448
D. 8 128

15. The total number of rounds in the tournament is

A. 2
B. 6
C. 7
D. 8

Use the following information to answer the next two questions.

The results of the weigh-in for the school wrestling team are, as follows:

Student name	Mass (kg)
Allan	60
Joseph	56
Hanif	54
Carl	68
Jacques	60
David	57
Marcel	48
Isaiah	65

16. The average (mean) mass of the members of the team is

A. 58.0 kg
B. 58.5 kg
C. 59.5 kg
D. 61.0 kg

17. The 62 kg class is made up of those wrestlers whose masses are more than 57 kg and less than 62 kg. Wrestlers with a mass of exactly 57 kg can wrestle in the 57 kg class.

The number of students who compete in the 62 kg class is

A. 0
B. 2
C. 3
D. 5

18. Khalid scored 84%, 77%, 91%, 76%, and 62% on his first five science tests. What minimum mark does he need on his last test to get an average of 80%?

A. 90%
B. 84%
C. 82%
D. 10%

19. Maria took 10 minutes to drive 10 km to work, while Fred took 30 minutes to drive 20 km. Who was travelling at the greater average speed, and by how much?

A. Maria by 20 km/h
B. Maria by 40 km/h
C. Fred by 10 km/h
D. Fred by 30 km/h

20. When 376 is divided by 13, the answer can be written as

A. 28 remainder 9
B. 28 remainder 10
C. 28 remainder 12
D. 28 remainder 28

21. When estimating circle problems **mentally**, the number 3 is often used in place of π. The number 3, in this case, is

A. slightly larger than the formula sheet value of π
B. slightly smaller than the formula sheet value of π
C. very much larger than the formula sheet value of π
D. very much smaller than the formula sheet value of π

22. In a computer design problem, the equation $d = 3a^2 + b^2$ is used. If $a = 5$ and $b = 3$, the value of d is

A. 234
B. 102
C. 84
D. 36

23. In some older multiple-choice tests, there were penalties given for wrong answers so that students were discouraged from guessing. For each correct answer, a person scored 3 points, for each incorrect answer, a person lost 1 point, and for each question not answered, a person scored 0 points. In such a test, Susan had 31 correct, 11 incorrect, and did not answer the remaining 8.

What was Susan's total score?

A. 104
B. 90
C. 82
D. 60

24. Barb bought a $250.00 coat in Québec and paid 13.5% in sales tax. She bought a $300.00 bicycle in New Brunswick and paid 15% in sales tax. After sales tax, she paid a total of

A. $706.75
B. $628.75
C. $628.38
D. $628.00

25. A total of 5% of a population is the smallest sample that can be used in a market research survey. If the population has 3 800 members, the minimum size of sample is

A. 76 000
B. 760
C. 190
D. 38

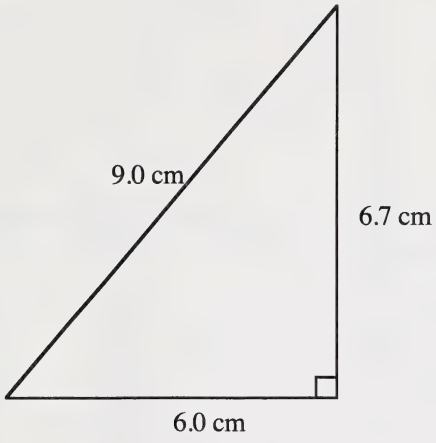
26. A total of 4% of a population is selected as a sample. If the sample has 45 members, the size of the population is

A. 49
B. 180
C. 400
D. 1 125

Use the following information to answer the next two questions.

An overhead projector produces a magnified image of a triangle on a screen.

Original triangle:



The original triangle has the lengths of its sides as 6.0 cm, 6.7 cm, and 9.0 cm. The sides of the triangle **on the screen** are 8 times larger than the original.

27. The perimeter of the triangle **on the screen** is

A. 160.8 cm
B. 173.6 cm
C. 1 286.4 cm
D. 1 388.8 cm

28. The area of the triangle **on the screen** is

A. 160.8 cm^2
B. 173.6 cm^2
C. 1 286.4 cm^2
D. 1 388.8 cm^2

29. An isosceles triangle has two equal angles with the third angle measuring 68°. Each of the equal angles therefore measures

A. 38°
B. 56°
C. 66°
D. 68°

30. A parallelogram has one side equal to 12.7 cm in length and a second side equal to 16.6 cm. The perimeter of the parallelogram is

A. 29.3 cm
B. 50.8 cm
C. 58.6 cm
D. 66.4 cm

31. What is the measure, in degrees, of each angle of a regular pentagon?

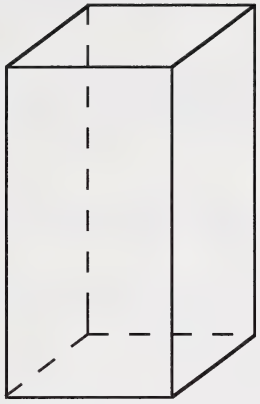
A. 72
B. 90
C. 105
D. 108

32. What is the area of a rectangle with one side of length 11 cm and a perimeter of 50 cm?

A. 154 cm^2
B. 308 cm^2
C. 429 cm^2
D. 550 cm^2

Use the following information to answer the next question.

A packing crate has the shape of a right rectangular prism, as shown in the diagram.



The crate has a square base of side 90 cm, a square top, and four congruent sides. The volume of the crate is 648 000 cm^3.

33. The height of the packing crate is

A. 72 cm
B. 80 cm
C. 125 cm
D. 139 cm

---

34. A silo used for grain storage has a cylindrical shape. The concrete base is circular, and the diameter is 6.0 m. The height is 15.0 m. The volume of the silo is approximately

A. 1 696 m^3
B. 424 m^3
C. 283 m^3
D. 28 m^3

35. The heights of a group of 450 children, 250 of them in preschool and 200 in Grade 6, are plotted on a frequency plot. The shape of the plot is **likely** to show

A. two peaks, one corresponding to the boys and one to the girls

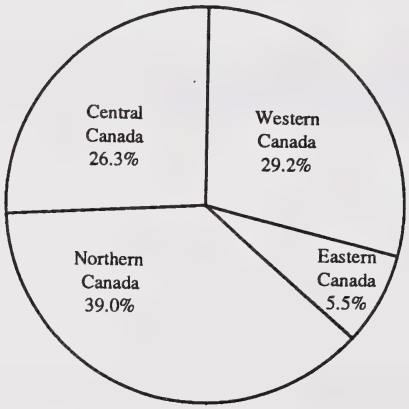
B. two peaks, one corresponding to the preschoolers and one to the Grade 6 students

C. one peak corresponding to the Grade 6 students, as the data are more accurate for Grade 6 students

D. one peak corresponding to the preschoolers, as there are more preschoolers than there are Grade 6 students

Use the following information to answer the next question.

The circle graph below shows the division of Canada's area by regions. The total area of Canada is 10 000 000 km^2.



36. The area of Eastern Canada is approximately

A. 2 500 000 km^2

B. 550 000 km^2

C. 198 000 km^2

D. 90 000 km^2

Use the following information to answer the next two questions.

In experiments involving random events, the probability P of an event is defined by the fraction $P = \dfrac{\textit{favourable situations}}{\textit{total possible situations}}$

37. A standard deck of cards contains 52 cards. In a particular situation, one card is randomly chosen. There are four aces and four kings in the deck. The probability of picking an ace or a king is

A. $\frac{2}{13}$

B. $\frac{2}{11}$

C. $\frac{9}{11}$

D. $\frac{11}{13}$

38. In an experiment involving short-term memory, the probability for success is $\frac{9}{11}$. In the same experiment, the probability for **failure** will be

A. $\frac{2}{11}$

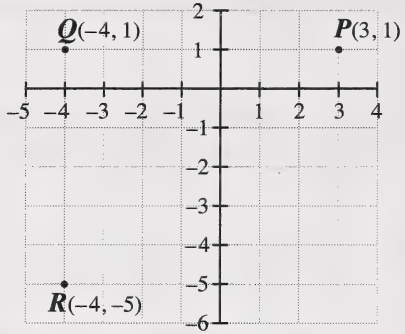
B. $\frac{9}{20}$

C. $\frac{11}{20}$

D. $\frac{9}{11}$

Use the following information to answer the next two questions.

The grid below shows the three points P, Q, and R. The fourth point S of the rectangle $PQRS$ has not yet been plotted.



39. The coordinates of point S are

A. (–11, 7)
B. (–11, –5)
C. (3, 7)
D. (3, –5)

40. The area of the rectangle $PQRS$ is

A. 42 square units
B. 28 square units
C. 8 square units
D. 4 square units

---

41. The variable n represents the number of dogs owned by a family. Assuming that all the dogs are perfectly normal and have four legs each, the total number of legs on the dogs is represented by the expression

A. $n + 4$
B. $n - 4$
C. n^4
D. $4n$

Part B: Written Response

Instructions

There are three written-response questions for a total of 15 marks in this section.

Marks are assigned using the *General Scoring Criteria*, which gives marks for work and communication, as well as to final answers. In particular, **correct answers with no work shown receive one mark only.**

Please write your answer in the test booklet as neatly as possible.

(5 marks) **1.** A piece of photocopying paper is very thin, and its thickness cannot be measured directly. A 500-sheet package of photocopying paper measures 28 cm long × 22 cm wide × 5.1 cm thick. A 200-sheet box of facial tissues measures 22 cm long × 12 cm wide × 7.2 cm thick.

a. Calculate the thickness of one sheet of photocopying paper.

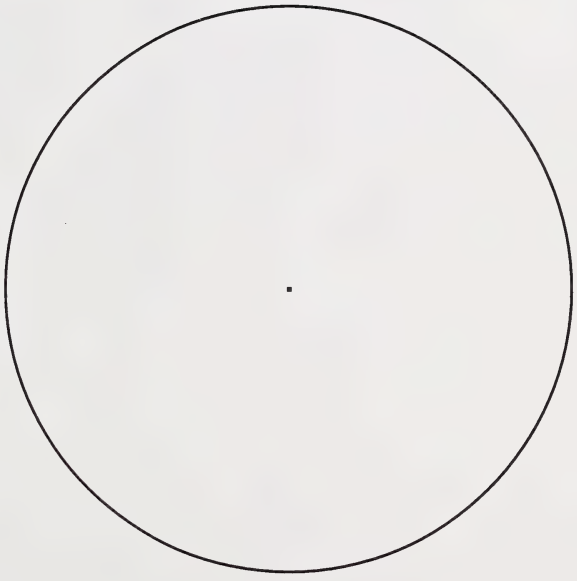
b. Calculate the thickness of one facial tissue, and explain why this calculated answer is likely to be very inaccurate.

(5 marks) **2.** The following chart appeared in a weekend edition of a local newspaper. The chart indicates the favourite sorts of music of people who read three different newspapers from three different geographic areas.

Music Choices of 1995			
Type of music	**Edmonton Journal**	**Calgary Herald**	**The Globe and Mail**
Rock and Roll	12	15	20
Western	13	55	15
Alternative	27	4	11
Rap	11	2	2
Classical	0	8	27
Reggae	26	3	5
Pop	6	7	4
Heavy Metal	5	6	6
Total	100	100	90

a. How does the chart show that readers of each of the three newspapers have **different** musical tastes?

b. Prepare a circle graph (pie chart) showing the music preferences of the 90 Globe and Mail readers. Show calculations of sector angles in the space provided, and use the circle below for your completed work.



(5 marks) **3.** Woody works in a hamburger restaurant. The restaurant uses toothpicks to hold the hamburgers together. Woody's boss found an excellent buy on a million toothpicks, and asked Woody to pick them up. This sounded like a lot of toothpicks. Woody wondered if a packing case containing these toothpicks would fit into the trunk of his small car.

a. One box holds 250 toothpicks. A carton holds 20 boxes. How many toothpicks does this carton hold?

b. How many cartons are needed to build a stack containing one million toothpicks?

c. One box of toothpicks measures 5.2 cm long × 2.7 cm wide × 1.3 cm high, and a carton of 20 boxes measures 10.4 cm long × 13.5 cm wide × 2.6 cm high.

What could be the dimensions of a packing case that holds a million toothpicks?

The trunk of Woody's car measures 0.7 m long × 1.3 m wide × 0.4 m high. Will this packing case fit into the car trunk?

Formula Sheet

The following information may be useful in writing this exam.

Take the value of π as 3.1415926 or the value using the π button of your calculator.

Coordinate Geometry

- The distance between two points (x_1, y_1) and (x_2, y_2) is

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

- The slope of a line segment with endpoints (x_1, y_1) and (x_2, y_2) is

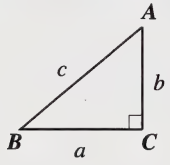
$$m = \frac{(y_2 - y_1)}{(x_2 - x_1)}$$

- The midpoint of a line segment with endpoints (x_1, y_1) and (x_2, y_2) is

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Pythagoras' Theorem

- In a right triangle labelled ABC, where $\angle C$ is the right angle, then $c^2 = a^2 + b^2$



Laws of Exponents

- $a^m \times a^n = a^{m+n}$
- $(a^m)^n = a^{mn}$
- $\frac{a^m}{a^n} = a^{m-n}$

Perimeters and Areas

- $P = 2(L + W)$
- $A = LW$
- $A = \frac{1}{2}bh$
- $A = \frac{1}{2}(a + b)h$
- $C = 2\pi r$
- $A = \pi r^2$
- $A = bh$

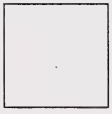
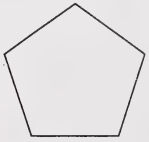
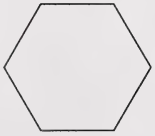
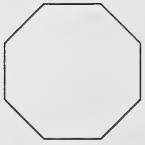
Volumes

- $V = LWH$
- $V = Ah$
- $V = \pi r^2 h$

Metric Prefixes

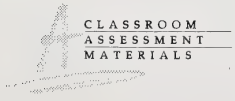
- milli = 0.001 or 10^{-3} or $\frac{1}{1\ 000}$
- centi = 0.01 or 10^{-2} or $\frac{1}{100}$
- deci = 0.1 or 10^{-1} or $\frac{1}{10}$
- kilo = 1 000 or 10^3

Regular Polygons

3 sides	4 sides	5 sides	6 sides	8 sides
				
Equilateral triangle	Square	Regular pentagon	Regular hexagon	Regular octagon

Mathematics 14

Performance Assessment



Performance Assessment

Description

Time allotted: 90 minutes
Total possible marks: 24

This is a **closed-book** test consisting of **three** tasks:

Task 1
starts on page 2 and has a value of 8 marks.

Task 2
starts on page 4 and has a value of 8 marks.

Task 3

starts on page 6 and has a value of 8 marks.

Instructions

- Fill in the information required on the test booklet as directed by your teacher.
- You are expected to provide your own calculator, ruler, and protractor; the school will provide measuring cylinders and objects for Task 1 and dice for Task 3. You may tear off the formula sheet provided.
- Show all your work, as marks will be assigned using the *General Scoring Criteria*, which assign marks to mathematical processes and to mathematical communication, as well as to final answers. In particular, **correct answers with no work shown receive one mark only, out of the eight possible.**

Background

People are faced with mathematical tasks in a variety of situations. The situations presented here set mathematical tasks for you, which relate to practical experiences in science laboratories, drafting, and games of chance.

In your first task, you will be measuring the volume of water displaced by different numbers of objects, graphing the data, and using the graph to make predictions.

The second situation will present you with the task of drawing a quadrilateral, and calculating its area by using two completely different methods.

In the third task, you will compare the results of throwing a 12-sided die with those obtained with two 6-sided dice.

Task 1: Objects In a Measuring Cylinder

If solid objects are placed in a jar of water, the water level will rise. The more objects that are placed in the jar, the more the water level will rise. This investigation is designed to relate the rise in water level to the number of identical objects placed in the jar.

Student instructions and information

Part 1: **a.** Fill your measuring cylinder half full of water.

b. Measure the volume of the water to the nearest millilitre. Record the result in a chart.

c. Put one object in the measuring cylinder.

d. Measure the new volume of the water and record the result in the chart.

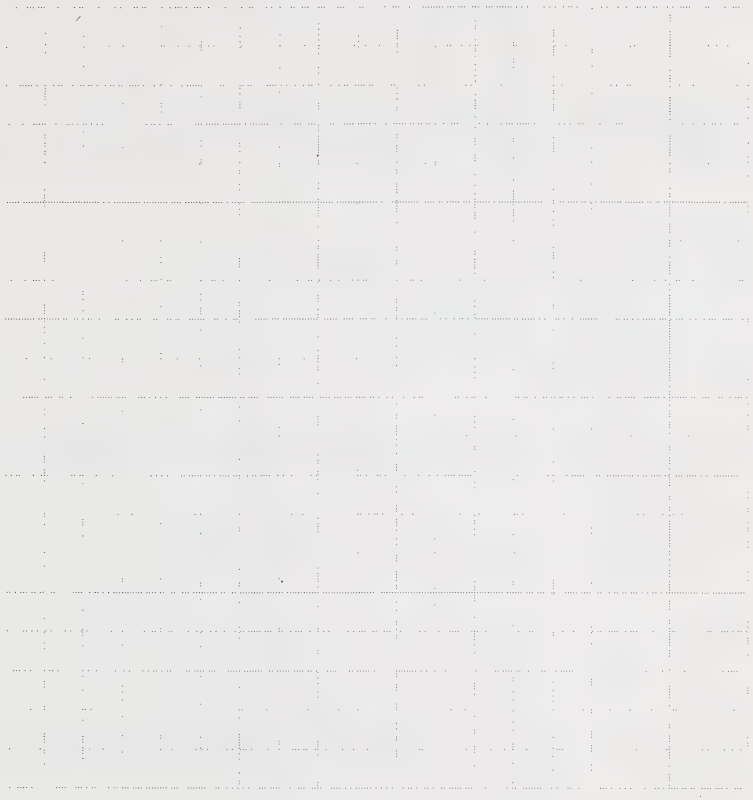
e. Repeats steps c. and d. several times.

Part 2: Complete your chart of measurements.

Part 3: Display your results in an appropriate graph. The graph should have measured volume on the vertical axis and the number of objects on the horizontal axis.

Chart of measurements

Graph Of Water Volume And Number Of Objects



Predictions

Average volume of one object:

Volume in the measuring cylinder if 20 objects have been put in the water:

Task 2: Determining the Area of a Quadrilateral

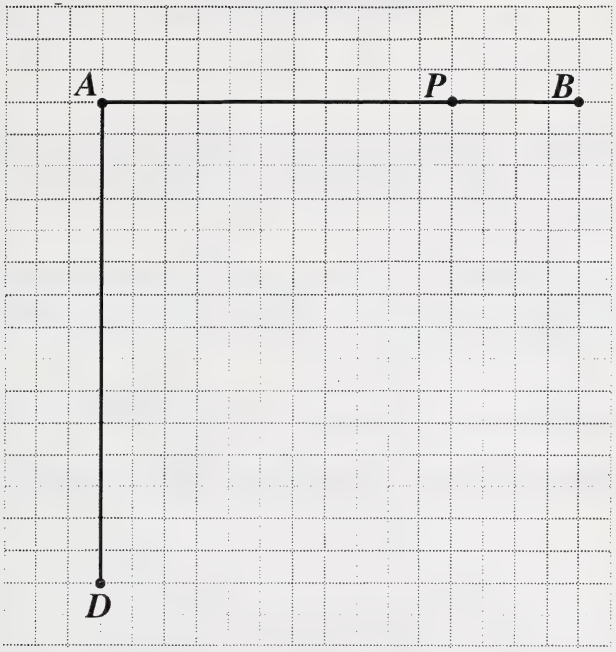
A drawing has been started on the facing page. The points A, B, P and D have been marked. The distances AB and AD are both 15 squares, and the distance AP is 11 squares. To complete the drawing:

1. Mark the point C so that $ABCD$ is a square.
2. Mark the point Q on BC, so that the distance BQ is 11 squares.
3. Mark the point R on CD, so that the distance CR is 11 squares.
4. Mark the point S on DA, so that the distance DS is 11 squares.
5. Join the points P, Q, R, and S.

The problem is to determine the area of the quadrilateral $PQRS$ in **two** different ways.

Finished Work

Drawing:



Calculations (remember to show your work):

Area of quadrilateral *PQRS*:

Area of quadrilateral *PQRS* (using an alternative method):

Task 3: Does One 12-Sided Die Equal Two 6-Sided Dice?

Procedure

Throw the 12-sided die 50 times and record the results in the third column of the first tally chart below. Combine these results with the results of the 50 throws that have already been entered in the second column of the tally chart. Record the total frequency in the fourth column of the tally chart.

Throw the pair of 6-sided dice 50 times and record the results in the third column of the second tally chart below. Combine these results with the results of the 50 throws that have already been entered in the second column of the tally chart. Record the total frequency in the fourth column of the tally chart.

Draw a frequency graph or histogram from **each** one of the tally charts.

After drawing the frequency graphs or histograms, answer the question that you will find on page 8.

Tally Charts

Chart 1: 12-sided die			
Score (12-sided die)	**Frequency (1st 50)**	**Tallies for second 50**	**Total frequency**
1	3		
2	5		
3	4		
4	4		
5	6		
6	3		
7	5		
8	3		
9	2		
10	6		
11	5		
12	4		

Chart 2: Pair of 6-sided dice			
Score (6-sided dice)	**Frequency (1st 50)**	**Tallies for second 50**	**Total frequency**
1	0		
2	2		
3	2		
4	3		
5	6		
6	7		
7	9		
8	7		
9	5		
10	5		
11	3		
12	1		

Frequency Graphs or Histograms

Note: there is a second grid on the next page if you want to draw each graph on its own grid.

Conclusions

Use one or two sentences to describe in what way the shapes of the graphs are the same, or in what way the shapes of the graphs are different.

Formula Sheet

The following information may be useful in writing this exam.

Take the value of π as 3.1415926 or the value using the π button of your calculator.

Coordinate Geometry

- The distance between two points (x_1, y_1) and (x_2, y_2) is

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

- The slope of a line segment with endpoints (x_1, y_1) and (x_2, y_2) is

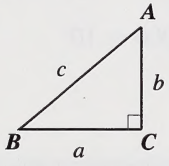
$$m = \frac{(y_2 - y_1)}{(x_2 - x_1)}$$

- The midpoint of a line segment with endpoints (x_1, y_1) and (x_2, y_2) is

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Pythagoras' Theorem

- In a right triangle labelled ABC, where $\angle C$ is the right angle, then $c^2 = a^2 + b^2$



Laws of Exponents

- $a^m \times a^n = a^{m+n}$
- $(a^m)^n = a^{mn}$
- $\frac{a^m}{a^n} = a^{m-n}$

Perimeters and Areas

- $P = 2(L + W)$
- $C = 2\pi r$
- $A = LW$
- $A = \pi r^2$
- $A = \frac{1}{2}bh$
- $A = bh$
- $A = \frac{1}{2}(a + b)h$

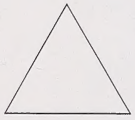
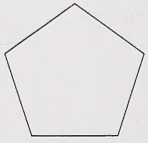
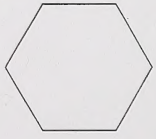
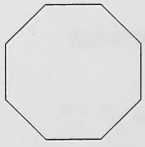
Volumes

- $V = LWH$
- $V = Ah$
- $V = \pi r^2 h$

Metric Prefixes

- milli = 0.001 or 10^{-3} or $\frac{1}{1\ 000}$
- deci = 0.1 or 10^{-1} or $\frac{1}{10}$
- centi = 0.01 or 10^{-2} or $\frac{1}{100}$
- kilo = 1 000 or 10^3

Regular Polygons

3 sides	4 sides	5 sides	6 sides	8 sides
				
Equilateral triangle	Square	Regular pentagon	Regular hexagon	Regular octagon

CLASSROOM ASSESSMENT MATERIALS

Manufactured and Distributed by
Education Advantage Inc.

To order call Toll Free
1-888-544-CAMP(2267)